

NON-PUBLIC?: N  
ACCESSION #: 9206010086  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Sequoyah Nuclear Plant, Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000327

TITLE: Turbine Trip Followed by a Reactor Trip as a Result of Loss of Load

EVENT DATE: 04/28/92 LER #: 92-010-00 REPORT DATE: 05/28/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: J. Bajraszewski, Compliance TELEPHONE: (615) 843-7749  
Licensing

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TB COMPONENT: RLY MANUFACTURER: A500  
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 28, 1992, at 2022 Eastern daylight time, with Unit 1 in power operation at approximately 100 percent, the turbine tripped as a result of a loss of load, followed by a reactor trip. The cause of the loss of load was attributed to a varying resistance ground within the gas-operated relay (GOR) on the Phase B main transformer. An 18-second delay in the turbine trip, following loss of load, resulted from an incomplete modification that did not remove a diode from an electrical circuit. The plant response to the transient following the turbine trip was as expected for a loss-of-load condition. A mercury switch, internal to the GOR, was replaced and the transformer was tested and returned to service. GORs on the remaining Unit 1 main transformers and the Unit 2 main transformer GORs were meggered and found acceptable. Subsequently, on May 23, 1992, the Unit 1 Phase C main transformer GOR developed a ground, and the relay was effectively isolated. Neither a turbine trip

nor a loss of load was induced by the ground. An evaluation of the failure mechanism is pending an outage of sufficient duration to replace the GOR or to inter-tie the spare main transformer.

END OF ABSTRACT

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## I. PLANT CONDITIONS

Unit 1 was in power operation at approximately 100 percent reactor thermal power.

## II. DESCRIPTION OF EVENT

### A. Event

On April 28, 1992, at approximately 2022 Eastern daylight time (EDT), with Unit 1 in power operation at approximately 100 percent, the turbine (EHS Code TB) tripped as a result of a loss of load. The turbine trip precipitated a reactor trip. Before the turbine trip, an abnormal alarm for battery board (EHS Code EI) No. 2 (250 volts VI) was received. This alarm was a result of a ground on the board. Less than one minute after the alarm, a relay (EHS Code EI) actuation opened the switchyard power circuit breakers (PCBs) (EHS Code FK). An 18-second delay in the turbine trip, following a loss of load, was a result of an incomplete modification that did not remove a diode from an electrical circuit. The loss of load was attributed to a varying resistance ground within the gas-operated relay (GOR) assembly on the Phase B main transformer (EHS Code EI).

### B. Inoperable Structures, Components, or Systems That Contributed to the Event

None.

### C. Dates and Approximate Times of Major Occurrences

November 1991 GORs on the Unit 1 main transformers were (approximately) found acceptable.

April 28, 1992 Ground on the 250-V battery No. 2 was at 2021 EDT annunciated on the main control room panels.

April 28, 1992 Both PCBs from the Unit 1 generator to the at 2022 EDT power system grid tripped open. The turbine tripped on subsequent sudden pressure relay actuation, followed by a reactor trip.

#### D. Other Systems or Secondary Functions Affected

The varying resistance ground was sensed by a diode circuit that initiated the 250-V battery-board alarm and actuated a relay that opened the PCBs, but did not trip the turbine. The ground progressed to contact closure, resulting in a turbine trip approximately 18 seconds after the PCBs opened. The reactor tripped as a result of the turbine trip, as designed.

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#### E. Method of Discovery

The PCBs tripping open and the subsequent turbine and reactor trips were annunciated on the main control room panels.

#### F. Operator Actions

Control room personnel responded as prescribed by emergency procedures. They promptly diagnosed the plant condition and took actions necessary to stabilize the unit in a safe condition and maintained the unit in the hot standby condition (Mode 3).

#### G. Safety System Responses

Safety systems performed and plant parameters responded as expected for a loss-of-load event. After the reactor trip, a pressurizer power-operated relief valve (PORV) lifted for a short duration (approximately 3 to 4 seconds), and tailpipe temperatures behaved as expected. There was no challenge to the pressurizer safety valves or to the pressurizer relief tank integrity. A review of the annunciator printout indicated that there was a transient momentary reduction (after the reactor trip) to the low reactor coolant system pressure reactor trip setpoint (1970 pounds per square inch gauge). The pressure decrease is as would be expected from the PORV lift.

The sudden pressure relay actuation on Phase B resulted in a

fire suppression spray-down of the Phase B main transformer.

### III. CAUSE OF THE EVENT

#### A. Immediate Cause

The reactor trip was precipitated by a turbine trip. The turbine tripped because of loss of load as a result of a ground in the Phase B main transformer GOR assembly.

#### B. Root Cause

The cause of this event was the result of a failure of the sudden pressure switch in the GOR on the Phase B main transformer. The sudden pressure switch failure resulted from its glass bulb mercury switch developing a small hole, allowing mercury to escape and come in contact with the switch wires and the metal clip holding the glass bulb. The cause of failure of the mercury switch could not be determined.

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#### C. Contributing Factors

None.

### IV. ANALYSIS OF THE EVENT

Plant response during and after the turbine trip was consistent with responses described in the final safety analysis report for a loss-of-load transient and, accordingly, the event did not adversely affect the health and safety of the public.

### V. CORRECTIVE ACTIONS

#### A. Immediate Corrective Actions

Control room personnel responded as prescribed by emergency procedures. They promptly diagnosed the plant condition and took actions necessary to stabilize the unit in a safe condition.

#### B. Corrective Action to Prevent Recurrence

Troubleshooting of the 250-V battery board No. 2 for grounds located the ground within the GOR assembly. A mercury switch, internal to the GOR, on the Phase B main transformer was

replaced.

The diodes that would allow the PCBs to open before a turbine trip were removed from the Units 1 and 2 main transformers, unit station service transformers, and yard inter-tie bank circuits. TVA is investigating the incomplete modification to determine cause and appropriate actions.

GORs on the remaining Unit 1 main transformers and the Unit 2 main transformer GORs were meggered and found acceptable.

Subsequently, on May 23, 1992, the Unit 1 Phase C main transformer GOR developed a ground and the relay was effectively isolated. Neither a turbine trip nor a loss of load was induced by the ground. An evaluation of the failure mechanism is pending an outage of sufficient duration to replace the GOR or to inter-tie the spare main transformer.

## VI. ADDITIONAL INFORMATION

### A. Failed Components

The failed component in this event was a glass bulb mercury switch.

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### B. Previous Similar Events

A review of previous events identified two LERs associated with either the GOR (LER 327/90022) or the sudden pressure relay (LER 327/86026). The corrective actions resulting from these LERs would not have prevented the event described in this LER. The actions from the previous LERs would not have identified the unforeseen equipment failure (i.e., mercury switch).

## VII. COMMITMENTS

None

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TVA  
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J. L. Wilson  
Vice President, Sequoyah Nuclear Plant

May 28, 1992

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 -  
DOCKET NO.  
50-327 - FACILITY OPERATING LICENSE DPR-77 - LICENSEE EVENT REPORT  
(LER)  
50-327/92010

The enclosed LER provides details concerning an automatic reactor trip during power operation. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as a condition that resulted in the automatic actuation of engineered safety features, including the reactor protection system.

Sincerely,

J. L. Wilson

Enclosure  
cc: See page 2

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U.S. Nuclear Regulatory Commission  
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May 28, 1992

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